



#### Practical Cost-Estimating and Validation Lessons Learned Workshop Additional Lessons Learned Questions

#### **Project Scope**

	Is the	project scope available?
Does	the sco	ppe reflect/address
		All available site information?
		Technical approach?
		Regulatory requirements?
		Cost- and schedule-control opportunities?
Does	the pro	ject/task scope include
		Description of the work to be performed?
		End condition or end product of work?
		Performance criteria and requirements?
		Discrete tasks and deliverables?
		Performance methodology and task plans?
	Are the major assumptions used in developing the project scope clearly identified and justified in the documentation? (The ground rules and assumptions may be identified in documents separate from the estimate.)	
		the documentation include the rationale used to develop task descriptions, logic ams, milestones, and resource requirements?
		the project scope documentation include specific activities associated with the o be performed and activity-based resource descriptions?
		the project scope documentation include descriptions of support activities (e.g., and safety, quality assurance, security) associated with the work to be med?

### **Project Scope**



 Has the project scope been developed at the lowest possible level of Work Breakdown Structure (WBS)/Code of Accounts (COA)?
 Do the U.S. Department of Energy (DOE) and contractor management place a strong emphasis on project/task scope?
 Do the individuals responsible for preparing cost estimates place a strong emphasis on project scope?
 Are project scopes formally updated?
 Are update logs used? What information is provided in these logs?
 Can the project scope be traced back to the original authors/reference materials? How?
 Does the project scope assign responsibilities?
 Does the project scope reflect the project/task WBS elements?
 Is there a WBS activity dictionary?
 As appropriate, does the project scope contain a technical logic diagram and/or process flow diagram?
 How is the scope creep addressed in cost estimates? Does everyone consider this issue? How should it be addressed?
 What part does cost estimating play in technology evaluation? What part should it play? How are new innovative technologies estimated? What kinds of potential improvements are possible?



#### **Schedules**

		e organizational units that perform the schedule-estimating functions identified on ganizational chart?
	Do foi	mal directives/procedures define the schedule-estimating authorization, implementation, review, and approval processes?
	Does	management support the formal scheduling process as defined by current directives?
	Is the	formally defined schedule-estimating process followed?
	Has a	critical path schedule been developed? Does it consider the following?
		Security restraints?
		Regulatory requirements and permits?
		Effects of legislation (e.g., Clean Air Act, Clean Water Act, Endangered Species Act, National Historic Preservation Act?
Have		owing factors been considered in developing project schedules (typically able to projects at the pre-construction stage):
		Mandated schedule and milestones?
		Budget-cycle timing?
		Headquarters reviews and approvals?
		Historical site characterization?
		Phased approach?
		Logical sequence of design, procurement, and construction?
		Procurement lead time for equipment/contractors?
		Reasonable manpower levels, buildup, and ramp-down?
		Facility limitations?
		Shift work or overtime work requirements?  Schedules

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	Safety requirements?
	Exposure constraints?
	Future regulations and policies?
	Availability of nonfinancial resources?
	Uncertainty of demand?
	Climate?
	Bonding and liability issues?
	Patent and intellectual property issues?
	Availability of funding?
	Others?
 Are s	chedules updated or revised as external factors change?
 Have	the possible effects of schedule delays been taken into consideration on interdependent projects?





#### **Change Control**

 Has responsibility been assigned for ensuring that a feedback system is in place and is used to inform cost estimators of any changes?
 Is there a comprehensive feedback system in place? Is it
Formal?
Informal?
 Is it being used?
 Are final project costs collected and compared with original estimates?
 Are cost data from ongoing and completed projects collected and maintained as a resource for improving cost estimation?
<u>Contracting</u>
 Do procedures require the participation of cost estimators in the selection of the contract vehicle?
 Are the procedures followed?
 Do procedures require the participation of cost estimators in the development/selection of standard and special contract clauses?
 Are the procedures followed?
 Is there a feedback procedure to ensure that cost estimators review and ascertain the cost impact of all clauses used in the contract?
 Is it used?
 Are estimates prepared (or reviewed) by cost estimators before bid opening and contract negotiation?



#### **Contracting**

		nators have responsibility for preparation, review, and/or approval for the If not, who does?
-		Contract vehicle selection?
-		Specification preparation?
-		Contract clause development/selection?
-		Schedule?
-		Bid evaluation?
-		Negotiations?
-		Award?
		Contract Changes
		ocedures stipulate that all contract modifications, including the negotiation of cost chedule, require the participation of the cost estimator?
	Are th	ne procedures practiced?
		ocedures require an estimate to be prepared before opening a proposal for act modifications?
	Are th	ne procedures practiced?





#### **Scope Revision**

	Is a system in place to ensure timely distribution of the latest version of design criteria, design documents, and contract documents to the cost and schedule estimators?
	Is it used?
	Is there a process in place that involves the cost and schedule estimators in project cost and schedule updates?
	Is it used?
	Are cost and schedule estimates routinely updated?
	Cost Estimate Safeguard
	Is there a process in place to ensure that estimates are safeguarded after completion?
Is the	process followed for
	Estimates?
	Budget estimates?
	Is there a list of personnel authorized to have prior knowledge of access to the formal estimate?
	Is the access list current and filed with the estimate?
	Is there a secure system (e.g., locking cabinets, safes, password-protected computer files) to safeguard the integrity of the estimates and supporting documentation and information?
	Is it used and controlled?





#### **Work Breakdown Structure**

 Is there a WBS activity dictionary?
 If so, does it provide detailed descriptions for each element?
 Is there a schedule associated with each element?
 Does the estimate breakdown follow the WBS activity?
 Is the estimate developed at the appropriate WBS level?
 Do all of the estimates associated with the scope of work reference their own WBS activity dictionary or COA dictionary?
 Is there a consistent application of the WBS?
 Is a database structured around the WBS to track costs and provide estimation data?



#### **Risk**

 Do procedures require a cost and schedule risk analysis to be performed on every program/project/task?
 How well do you need to understand the risk analysis to apply cost estimates?
 Is a cost and schedule risk analysis performed on each program/project/task?
 Is there dialogue between the individuals performing the cost and schedule risk analyses/contingency estimates and other appropriate personnel (e.g., management, budgeting, technical)?
 Are quantitative methods used to conduct risk analyses? Identify the methods.
 Are they automated?
 Are the contingency estimates a direct result of the risk analysis process?
 Is there a clear understanding of responsibility for performing and coordinating cost and schedule risk analyses?
 Are cost and schedule risk levels and contingency estimates clearly documented and appropriately entered into the cost estimate?
 Is there a separate risk identification and tracking system in place?
 Is it used?
 Is there a formal procedure for doing cost and schedule risk analysis calculations?
 Does this procedure also generate contingency-fund estimating requirements?
 Are feasibility study cost estimates identified but not performed? What can be done to prevent this oversight?



#### **General**

 Did the staff responsible for preparing the estimate demonstrate a thorough understanding of the project work and its schedule?
 Was the cost-estimating function allocated sufficient time and resources for each estimate?
 Has the project/task purpose been defined?
 Does the project/task purpose reflect an adequate level of detail?
 Is there documentation (e.g., thorough reviews) of a clear understanding of project requirements/specifications?
 Have the roles of DOE, other contractors, and subcontractors been defined?
 Are site-specific conditions/requirements identified?
 Are all job-related documents referenced and available for review?
 Is there a planning checklist to ensure that planning is handled systematically?
 Has a detailed project schedule been established?
 Is the detailed project schedule available for review?
 Is there documentation available to ensure that all requirements, schedules, and conditions are current?
 Are there references to other functional elements?
 Have all related functional elements been identified?
 Has coordination with these elements been achieved?
 Have ground rules and assumptions been defined?



#### **Cost Estimate Evaluation**

 Are Life Cycle Cost Analysis (LCCAs) required?
 Is a process in place to ensure that LCCAs are performed on a timely basis for project planning?
 Do the procedures ensure involvement of cost estimators in the LCCA process?
 Are the procedures followed?
 Does the process produce LCCAs that are comprehensive and that address project alternatives?
 Are LCCAs reviewed and approved?
Value Engineering
 Is there an implementing order in the DOE Operations Office requiring value engineering studies in accordance with DOE Order 4010.1, Executive Order 12615, FAR 48.102C, and FAR 52.248.1?
 Is the implementing order followed?
 Are value engineering studies a formal requirement for the project design/approval process?
 Does the value engineering process require full participation of cost estimators?
Are cost estimators participating members of the study team?

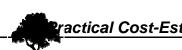




#### **Requirements for Cost Estimate**

Are there directives concerning authority and responsibility for formal approval of cost

estimates at		
	DOE offices?	
	Other contractor offices?	
	Have formal criteria been developed to determine the points in the project development sequence (MSA and MPs) that require formal DOE and contractor management review and approval of cost and schedule estimates?	
	Are directives available, effectively distributed and current?	
	Are they used?	
	Are personnel aware of how the directives affect their participation in the review and approval process?	
	Do personnel follow the appropriate directives?	
	Have requirements for the contents of a cost- and schedule-review package been defined?	





#### **Procedures**

 Are there procedures to involve cost and schedule estimators in the development of DOE positions on agreements (e.g., compliance and interagency)?
 Is there a procedure to ensure that cost and schedule estimators receive feedback on results and subsequent amendments?
 Are these procedures used?
 Are these procedures effective?
 Do these procedures involve the management and operating/national laboratory estimators in cost and schedule negotiations with their subcontractors? Are these procedures used and effective? Is independence maintained?
 Cost estimating is an art rather than an exact science. How does this affect in its success or failure?
<u>Miscellaneous</u>
 Is the review process documented with well-defined levels of responsibility and (signature) authority?
 Are responsibilities properly assigned?
 Are ICEs prepared, reviewed, and approved at appropriate times?
 Does the practice of review, approval, and forwarding of cost estimates follow the process documented?



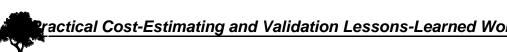
#### **Cost Estimate Documentation**

	Is the supporting documentation complete and reasonable?		
	Are analyses fully documented?		
	Are cost-element considerations reasonable and documented?		
Is the estimate			
	Clear?		
	Accurate?		
	Does the estimate identify and properly include subcontracting costs?		
	Are indirects identifiable?		
	Are indirects applied in accordance with site accounting methods?		
	Do indirect cost application and estimator knowledge ensure that there is no duplication or apparent "double-dipping"? [Note: Provide copies of estimate summary sheet(s) showing indirect markups to the Indirects subteam for review.]		
	For the estimates reviewed, was a cost estimate performed to evaluate the reasonableness of prime and subcontractor proposals?		
	Is a log of coordination efforts and contacts maintained?		
	Have historical cost and schedule data been collected, maintained, and used in preparing these estimates?		
	Have historical costs and data been properly adjusted?		
	Were previous estimates available and used?		
	If used, were they reconciled?		
	Were proper inflation factors applied (constant-year dollars to midpoint of each work element, such as assessment, design, construction, cleanup, operations, and maintenance)?		
	Are present-value estimates required?		

#### **Quality Control**



 Is a formal quality control process in place for reviewing cost and schedule estimates?
 Is a defined process in place for resolving problems encountered during review and for maintaining the quality of the cost and schedule estimates?
 Is concurrence of the cost or schedule estimator required when the cost or schedule estimate is changed?
 Are reviewers prohibited from changing the cost estimate? (The cost estimate should be sent back to the cost estimator for reestimating.)
 Are all review comments, including design, returned to the cost estimator for cost impact?
 Are estimating assumptions documented and included in the quality control review package?
 Is an independent schedule review made?
 Is a procedure in place to compare estimates to historical data from analogous projects?
 Is a procedure in place to address estimates rejected because of poor quality? How is the modified estimate processed?
 Is there a procedure in place, such as peer review, to ensure that all estimates are logical to other estimators and their supervisors?
If an estimate is only partially done, how is this fact conveyed to others?





#### **Contingency**

 Does the estimate include a contingency allowance?
 Is contingency separately identified and included?
 Is the contingency allowance adequately described in the estimate narrative?
Project Schedule Development
 Does the project schedule reflect a clear and complete understanding of the scope of work?
 Does the schedule reflect an accurate knowledge of resource availability and construction methods?
 Is the project schedule commensurate with the cost estimate and resource allocations?
 Is the project schedule updated and maintained as the project is further developed?
 Is a log maintained to record updates and revisions?
 Are scheduling tools available?
 Are they used?
 Is there an allowance for schedule slips?
Are there milestone description sheets?



# Appendix H: Additional Lessons-Learned Questions